



Upper tropospheric humidity observations by Odin-SMR

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Upper tropospheric humidity and high cirrus clouds are key factors in the radiative balance of the Earth. Due to lack of relevant measurement data, the accuracy of today's climate models is limited by the insufficient representation of these constituents. Long-term measurements with complementary instruments are a requirement to achieve a better understanding of the distribution and dynamics of water in the upper troposphere.

The sub-mm radiometer onboard the Odin satellite, Odin-SMR, is a limb-sounder operating at frequencies around 500 GHz. The observations have sensitivity down to 10 km, but tangent altitudes inside the troposphere have previously been ignored due to cloud scattering. A dedicated retrieval scheme has been developed to give the all weather mean relative humidity between 10-15 km. Spectra are treated individually and the retrieval includes a method to determine and correct for the presence of clouds. Main uncertainties are calibration uncertainty, compensation for cloud scattering and spectroscopic information.

First tropospheric retrievals have shown a good general agreement compared to MLS data. Extended comparisons with other satellite (MLS, MIPAS) and model (ECHAM5/MESSy) data will be presented. The sun-synchronous orbit of Odin further allows for studies of the morning/evening difference of tropical upper tropospheric humidity, as the ascending node is fixed at 06:00. Combined with observations from other satellites, the full diurnal cycle could potentially be investigated in detail.